Science for Communities

Invasive Pneumococcal Disease Quarterly Report
April–June 2022

Background

Since 17 October 2008, invasive pneumococcal disease (IPD) has been notifiable to the local Medical Officer of Health under the Health Act 1956. The pneumococcal conjugate vaccine (PCV) was added to the New Zealand childhood immunisation schedule on 1 June 2008. The vaccine used on the schedule has changed a number of times: • Prevenar® (PCV7) was used from June 2008 to June 2011, • Synflorix® (PCV10) was used from July 2011 to June 2014, • Prevenar13® (PCV13) was used from July 2014 to June 2017, • Synflorix® (PCV10) has been used since July 2017. The current PCV childhood immunisation schedule is a 2 plus 1 regime and includes doses at 6 weeks, 5 months, and 12 months of age. This regime has been in place since July 2020, when it changed from a 3 plus 1 schedule with the 3 month dose of PCV10 was removed from the schedule.

PCV10 includes the seven serotypes in PCV7 (4, 6B, 9V, 14, 18C, 19F and 23F) as well as serotypes 1, 5 and 7F. PCV13 includes the 10 serotypes in PCV10 as well as serotypes 3, 6A and 19A. In addition, PCV13 and the 23-valent pneumococcal polysaccharide vaccine (23PPV, Pneumovax 23) are recommended for individuals with medical conditions that increase the risk of IPD. 23PPV includes the 13 serotypes of PCV13 as well as serotypes 2, 8, 9N, 10A, 11A, 12F, 15B, 17F, 20, 22F and 33F.

The data presented in this report (except for immunisation status) is based on the information recorded on EpiSurv, the national notifiable disease surveillance system, as at 1 July 2022. Any updates made to EpiSurv data by public health unit staff after this date will not be reflected in this report. The immunisation status of cases that were eligible for PCV vaccination was extracted from the National Immunisation Register (NIR).

The incidence of cases is assessed against a threshold for cases due to the three additional serotypes covered by PCV13 (3, 6A and 19A) as well as for 19A serotype cases, at the end of each quarter for the previous 12-month period. A 12-month period is used due to the small number of cases. If the incidence for a particular 12-month period exceeds the threshold, further assessment will be undertaken to evaluate the role of PCV-10 vaccine re-introduction after PCV-13.

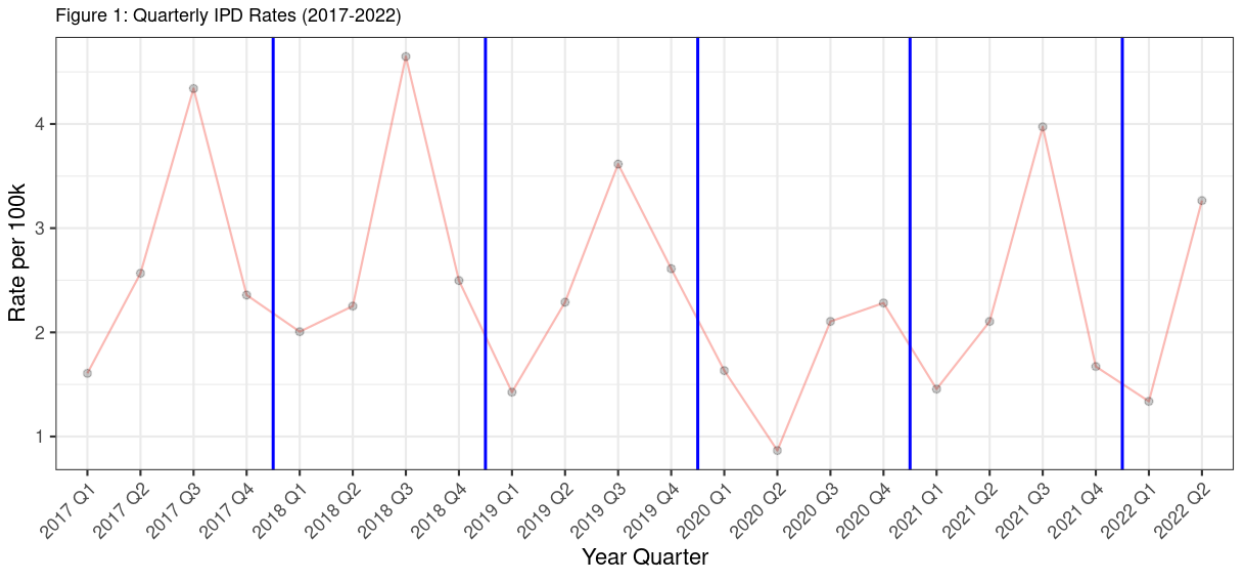
Note: a threshold breach does not confirm that the change in vaccine type is the explanation, but it indicates the need to investigate further. Further investigation will look into serotype information (vaccine and non-vaccine serotype), case-specific factors, such as immunisation status, and the presence of underlying health conditions or risk factors which may have predisposed the case to disease.

These quarterly and threshold reports are part of an enhanced surveillance programme to monitor the impact of PCV vaccination, including the changes in vaccine valency, on the epidemiology of IPD in New Zealand.

Quarterly rates of IPD

There were 166 IPD cases notified between April and June 2022 (Q2 2022). This is the highest number of cases reported in Q2 of any year since IPD became notifiable (n=161 cases in Q2 2009) (Figure 1).

Figure 1: Quarterly IPD rates (2017-2022)



Threshold analyses (IPD cases in children less than 2 years of age, 12 months ending June 2022)

The threshold for 19A has been established at 9.1 cases per 100,000 children less than 2 years of age. The rates we report are based on cumulative cases over a four-quarter time-period. For the 12 months ending in June 2020 (Q2 2020), the rate of 19A was 4.1 per 100,000 and remained steady until the rate increased to 7.5 for the 12 months ending in December 2020 (Q4 2020) (Figure 2 and Table 1).

In the 12 months ending in June 2021 (Q2 2021), the rate for 19A cases exceeded the threshold for the first time, with a rate of 13.3 cases per 100,000.

In the 12 months ending in September 2021 (Q3 2021), the rate of 19A cases continued to increase, reaching 17.4 cases per 100,000.

In the 12 months ending in June 2022 (Q2 2022), the rate of 19A cases reached a record high to date, with 22.4 cases per 100,000.

The rate for the combined serotypes of interest (3, 6A, and 19A) has steadily increased in the previous four threshold analyses, and also exceeded the threshold, with a rate of 18.3 per 100,000 in the 12 months ending in September 2021. The rate for the combined serotypes of interest has reached a record high of 24.9 in the 12 months ending in June 2022. These increases are largely explained by the increase in 19A (since early 2020, 19A has represented more than 90% of cases of the combined serotypes).

Figure 2: Quarterly IPD incidence rate per 100,000 children less than 2 years of age for the previous 12 months ending 30 June 2022

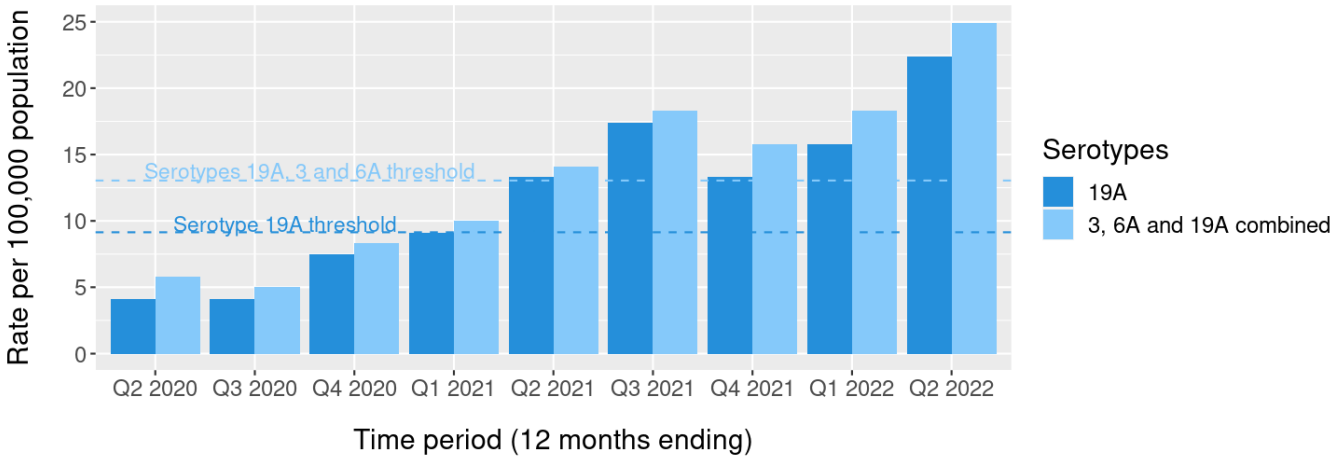


Table 1: Threshold table of quarterly IPD incidence rate per 100,000 children less than 2 years of age

Serotypes	Q2 2020	Q3 2020	Q4 2020	Q1 2021	Q2 2021	Q3 2021	Q4 2021	Q1 2022	Q2 2022
3, 6A and 19A combined	5.8	5	8.3	10	14.1	18.3	15.8	18.3	24.9
19A	4.1	4.1	7.5	9.1	13.3	17.4	13.3	15.8	22.4

Vaccine preventable incident cases

Among children under 5 years of age, the number of IPD cases that are PCV10-vaccine preventable has remained low since 2017. However, the proportion of PCV13-vaccine preventable cases that are 19A has increased since 2017.

The number of cases with PCV13 preventable serotypes among children under 5 years of age has steadily increased since 2018 (Table 2). In 2017, 36.4% of all vaccine preventable cases (PCV13-specific serotypes) were 19A. In 2021, the proportion reached 89% of all vaccine

preventable cases (PCV13-specific serotypes). Through Q2 2022, 28 of 29 (96.6%) PCV13-serotype cases in children under 5 years have been 19A. Since 2019, 90% of all PCV13-vaccine preventable cases in children under 5 years have been serotype 19A (88/98).,

The proportion of cases due to a PCV13 serotype that are 19A among all ages has also steadily increased since 2017. In 2019, 49.2% of all cases due to a PCV13 serotype were 19A, this increased to 75.0% in 2021. In 2022 through Q2, 79.4% of cases due to a PCV13 serotype are 19A.

Table 2: Distribution of vaccine preventable serotypes (2017-2022)

Year	No. IPD cases	No. IPD cases with known serotypes*	No. with Vaccine Preventable Serotypes (PCV10)	No. with PCV13 Serotypes	No. 19A Cases (% of PCV13 cases)	No. IPD cases in Children Under 5 Years of Age**	No. with Vaccine Preventable Serotypes (PCV10) for Children Under 5 Years of Age	No. with PCV13 Serotypes for Children Under 5 Years of Age	No. 19A Cases (% of cases with PCV13 serotypes in children under 5 years of age)
2017	521	482	74	169	60(35.5%)	34	3	11	4(36.4%)
2018	557	523	52	163	75(46.0%)	39	1	7	4(57.1%)
2019	495	461	38	132	65(49.2%)	38	1	13	10(76.9%)
2020	350	335	18	114	71(62.3%)	36	0	20	18(90.0%)
2021	468	451	25	184	138(75.0%)	61	1	36	32(88.9%)
2022	232	226	8	102	81(79.4%)	34	0	29	28(96.6%)

*Not all cases reported in 2022 have serotype results available at this time
**Includes cases with unknown serotype

Deaths

Based on the information in EpiSurv, the total number of people who have died with a diagnosis of IPD at the time of death in 2022 to date is 19. The number of deaths with serotype 19A is *n*=6. Importantly, the main causes of death are not yet final for most cases.

Immunisation status

Of all PCV eligible children born after 1 January 2008, 38 children were diagnosed with IPD in 2022 through Q2. Of these 38 children, 31 had NIR data available and 7 had no NIR data and were assumed to be unvaccinated. Of these 38 children, 76.3% (n=29) were serotype 19A, 2.6% (n=1) was serotype 3, and 21.1% (n=8) were non-PCV serotypes or the serotype is unknown (Table 3).

There was one IPD case that was serotype 3 which is covered by PCV13. This child had received 3 doses of PCV10.

The other observed vaccine preventable serotype was 19A (also covered by PCV13). None of 29 cases with 19A serotype who were eligible for vaccination, had been vaccinated with PCV13. 6 were unvaccinated. The remainder had been vaccinated with PCV 10 (10 had 1-2 doses , 4 had 3 doses , 8 had 4 doses). It is unknown whether these children were eligible to receive PCV 13 due to having a high-risk condition.

Table 3: Immunisation status of all IPD cases in all PCV eligible children born after 1 January 2008 (2022 through quarter 2) (n=38)

Vaccine received and number of doses	PCV7 Serotypes							PCV10 Serotypes			PCV13 Serotypes			Non-PCV Serotypes or UNK	Total cases by vaccine and by number of doses
	4	6B	9V	14	18C	19F	23F	1	5	7F	19A	3	6A		
PCV7															
1														1	1
2															
3															
4											1			1	2
PCV10															
1											1				1
2											9			3	12
3											4	1		1	6
4											8			1	9
PCV13															
1															
2															
3															
4															
Unvaccinated											6			1	7
Total											29	1		8	38

Note: blank cells represent 0 observations.

The year-to-date totals for all serotypes by year are shown in Table 4. In 2022, the total number of IPD cases reported year-to-date through June (n=232) is the most reported year-to-date since IPD became notifiable (2009 n=220).

Of the PCV13 serotypes reported since 2019, serotype 19A is the most commonly reported vaccine serotype and has been steadily increasing in incidence. Serotype 3 has remained relatively stable. In 2021, n=44 19A cases were reported through June, and in 2022, n=81 19A cases were reported through June. It is important to note that serotype data are often delayed, therefore, the most recent IPD isolates will likely have a much higher proportion of missing serotype information.

Table 4: Year-to-date cumulative totals by year and serotype

	2019	2020	2021	2022
Serotypes	June Year-To-Date Cumulative Totals			
PCV10	**18**	**6**	**8**	**8**
1	1			
4	2	2	1	
5				
6B	1		1	2
7F	6	1	3	5
9V	1			
14	1		1	
18C				
19F	5	2	2	1
23F	1	1		
PCV13 only	**28**	**30**	**55**	**94**
3	12	12	11	13
6A				
19A	16	18	44	81
Other	**128**	**88**	**109**	**124**
Unknown	**11**	**3**	**10**	**6**
Total	**185**	**127**	**182**	**232**

The year-to-date 19A totals for age groups by year are shown in Table 5. There is an increase in the incidence of cases in the younger age groups over time – in the year to date for 2022 – approximately a third of cases are under five years (around 20 percent under 2 years) compared to 2019 when about 20 percent of cases were under five years and there were no cases under 2 years).

Table 5: Year-to-date 19A cumulative totals by year and age group

	2019	2020	2021	2022
Age group (years)	June Year-To-Date Cumulative Totals (percent of total)			
<2			7 (15.9)	18 (22.2)
2-4	3 (18.8)	2 (11.1)	4 (9.1)	10 (12.4)
5 or older	13 (81.2)	16 (88.9)	33 (75.0)	53 (65.4)
Total 19A	16	18	44	81

The year-to-date 19A totals for prioritized ethnicity groups by year are shown in Table 6. In 2021, 20 of the 44 19A cases reported through June were European/Other (45.5%), 10 were Māori (22.7%), 11 were Pacific Peoples (25.0%), and 3 were Asian (6.8%). In 2022, 31 of the 81 19A cases reported through June were European/Other (38.3%), 23 were Māori (28.4%), 15 were Pacific Peoples (18.5%), and 8 were Asian (9.9%); the ethnicity of 4 is still unknown (4.9%).

Although the number of 19A cases have increased across all ethnic groups, Māori/Pacific peoples are overrepresented in the number of cases - with 46.9 percent of cases in these ethnic groups in 2022.

Table 6: Year-to-date 19A cumulative totals by year and ethnicity

	2019	2020	2021	2022
Ethnicity	June Year-To-Date Cumulative Totals			
European/Other	12 (75.0)	8 (44.4)	20 (45.5)	31 (38.3)
Māori	2 (12.5)	5 (27.8)	10 (22.7)	23 (28.4)
Pacific Peoples	1 (6.3)	4 (22.2)	11 (25.0)	15 (18.5)
Asian	1 (6.3)	1 (5.6)	3 (6.8)	8 (9.9)
Unknown				4 (4.9)
Total 19A	16	18	44	81

The year-to-date cumulative totals for all serotypes by year and district are shown in Table 7. The Northern Region has consistently had the highest number of IPD cases through June (n=98 in 2022). The number of children under 5 years diagnosed with IPD in the Northern Region (n=20) has nearly doubled since 2021 (n=11) and is a record number reported through June since IPD became notifiable.

Table 7: Total IPD cases by age group (all ages and <5) by district and region (through June YTD 2019-22)

District	2019		2020		2021		2022	
	<5	All ages	<5	All ages	<5	All ages	<5	All ages
Northland		10		10	1	15	3	21
Waitemata		23		13	5	28	5	19
Auckland	1	18	1	8	2	8	4	18
Counties Manukau	1	26	1	26	3	19	8	40
Northern region	**2**	**77**	**2**	**57**	**11**	**70**	**20**	**98**
Waikato	3	16	3	24	2	18	3	18
Lakes		5		4		4	2	13
Bay of Plenty	1	17	1	5		12		15
Tairawhiti				2		6		2
Taranaki		3		2		7		5
Midland region	**4**	**41**	**4**	**37**	**2**	**47**	**5**	**53**
Hawke's Bay		8		8	2	9	5	17
Whanganui				3		2		5
MidCentral		7		3		4		6
Hutt Valley	1	6	1	1	2	6		11
Capital & Coast		5		2	4	11	2	7
Wairarapa		1		4		1		3
Nelson Marlborough		5			1	4	1	2
Central region	**1**	**32**	**1**	**21**	**9**	**37**	**8**	**51**
West Coast		2				2		
Canterbury	3	17	3	8	2	15	2	16
South Canterbury		2		3		2		3
Southern		9		3	3	9	1	11
Southern region	**3**	**30**	**3**	**14**	**5**	**28**	**3**	**30**
Total	**10**	**180**	**10**	**129**	**27**	**182**	**36**	**232**

The year-to-date cumulative 19A cases by year and district are shown in Table 8. Most 19A cases have been diagnosed in the Northern Region. The number of 19A cases has increased by 2-fold in all regions except the Midland Region in 2022 as compared to 2021. In the Northern Region, the number of 19A cases in children under 5 years has nearly tripled when compared to 2021.

Table 8: 19A cases by age group (all ages and <5) by district and region (through June YTD 2019-22)

District	2019		2020		2021		2022	
	<5	All ages	<5	All ages	<5	All ages	<5	All ages
Northland		2		2		2	2	5
Waitemata		3		1	3	9	5	9
Auckland		2			1	1	3	8
Counties Manukau			1	6	2	8	6	15
Northern region	**0**	**7**	**1**	**9**	**6**	**20**	**16**	**37**
Waikato	2	2		2		7	3	7
Lakes						1	1	3
Bay of Plenty	1	1	1	2		2		1
Tairawhiti						1		
Taranaki								
Midland region	**3**	**3**	**1**	**4**	**0**	**11**	**4**	**11**
Hawke's Bay				1		2	3	5
Whanganui						2		2
MidCentral		1				1		2
Hutt Valley		1			1	2		4
Capital & Coast		1				1	2	4
Wairarapa				2				2
Nelson Marlborough								
Central region	**0**	**3**	**0**	**3**	**1**	**8**	**5**	**19**
West Coast								
Canterbury		1		2	2	2	2	9
South Canterbury								2
Southern		2			2	3	1	3
Southern region	**0**	**3**	**0**	**2**	**4**	**5**	**3**	**14**
Total	**3**	**16**	**2**	**18**	**11**	**44**	**28**	**81**